

We Claim:

1 1. A transpiration cooled heat sink comprising:
2 a heat sink base structure, said heat sink base structure having a coolant
3 inlet for receiving a coolant and a coolant outlet for distributing a coolant, wherein said
4 heat sink base structure defines at least one coolant channel disposed so as to be
5 communicated with said coolant inlet and said coolant outlet; and
6 a coolant distribution structure, wherein said coolant distribution structure
7 defines at least one distribution cavity and includes at least one distribution inlet
8 communicated with said distribution cavity and wherein said coolant distribution
9 structure is disposed relative to said heat sink base structure such that said distribution
10 inlet is communicated with said coolant outlet.

1 2. A transpiration cooled heat sink according to claim 1, wherein said coolant
2 distribution structure further includes at least one distribution member, wherein said
3 distribution cavity is disposed within said distribution member.

1 3. A transpiration cooled heat sink according to claim 1, wherein said coolant
2 distribution structure is constructed of a porous material.

1 4. A transpiration cooled heat sink according to claim 1, wherein said heat
2 sink base is constructed from copper.

1 5. A transpiration cooled heat sink according to claim 1, further comprising a
2 distribution outlet communicated with said distribution cavity, a heat transfer surface and
3 a module attachment structure, wherein said module attachment structure defines a
4 plurality of module channels and wherein said heat transfer surface is nonmovably
5 associated with said module attachment structure.

1 6. A transpiration cooled heat sink according to claim 5, wherein said heat
2 transfer surface is disposed relative to said module attachment structure so as to be
3 communicated with said distribution outlet and said plurality of module channels.

1 7. A transpiration cooled heat sink according to claim 5, further comprising a
2 coolant distribution device disposed within said plurality of module channels so as to be
3 communicated with said distribution outlet and said heat transfer surface.

1 8. A transpiration cooled heat sink according to claim 7, wherein said coolant
2 distribution device is constructed of a wicking material.

1 9. A transpiration cooled heat sink according to claim 7, wherein said coolant
2 distribution device is cotton string.

1 10. A transpiration cooled heat sink according to claim 5, wherein said heat
2 transfer surface is constructed of porous material.

1 11. A transpiration cooled heat sink according to claim 5, wherein said heat
2 transfer surface is constructed of copper.

1 12. A transpiration cooled heat sink according to claim 5, wherein said module
2 attachment structure is constructed from copper.

1 13. A self contained coolant supply for a transpiration cooled heat sink
2 comprising:

3 a coolant production apparatus, said coolant production apparatus having
4 an airflow inlet for receiving an airflow, an airflow outlet for discharging said airflow, a
5 dehumidification unit for extracting a coolant from said airflow and a product outlet for
6 discharging said coolant; and

7 a coolant storage structure, wherein said coolant storage structure defines a
8 storage cavity for containing said coolant and includes a storage inlet and a storage outlet,
9 wherein said storage inlet is communicated with said storage cavity and said coolant
10 outlet and wherein said storage outlet is communicated with said storage cavity and a
11 transpiration cooled heat sink.

1 14. A self contained coolant supply for a transpiration cooled heat sink
2 according to claim 13, further comprising a coolant level measuring device disposed so as
3 to be communicated with said storage cavity.

1 15. A self contained coolant supply for a transpiration cooled heat sink
2 according to claim 13, further comprising a pumping device disposed so as to be
3 communicated in series fashion with said storage outlet and said transpiration cooled heat
4 sink.

1 16. A self contained coolant supply for a transpiration cooled heat sink
2 according to claim 15, wherein said pumping device is a centrifugal pump.

1 17. A self contained coolant supply for a transpiration cooled heat sink
2 according to claim 13, wherein said dehumidification unit includes a control device
3 communicated with a power source.

1 18. A self contained coolant supply for a transpiration cooled heat sink
2 according to claim 13, wherein said dehumidification unit is disposed within said coolant
3 production apparatus so as to be communicated with said airflow inlet.

1 19. A method for using a transpiration cooled heat sink and a self contained
2 coolant supply for a transpiration cooled heat sink comprising:

3 obtaining a transpiration cooled heat sink having a coolant inlet, a self
4 contained coolant supply for a transpiration cooled heat sink having a dehumidification
5 unit, a coolant storage structure and a storage outlet and an electronic system which
6 includes at least one electronic device having a device outer surface;

7 positioning said self contained coolant supply within said electronic
8 system so as to receive an airflow;

9 attaching said transpiration cooled heat sink to said electronic device so as
10 to communicate said transpiration cooled heat sink with said device outer surface;

11 communicating said coolant inlet with said storage outlet; and

12 operating said self contained coolant supply so as to produce said coolant.

1 20. A method according to claim 19, wherein said attaching said transpiration
2 cooled heat sink to said electronic device includes attaching said transpiration cooled heat
3 sink to said electronic device using clips.

1 21. A method according to claim 19, wherein said operating said self
2 contained coolant supply so as to produce said coolant includes operating said
3 dehumidification unit so as to extract a coolant from said airflow and storing said coolant
4 within said coolant storage structure.

1 22. A method according to claim 19, wherein said obtaining a transpiration
2 cooled heat sink includes obtaining a self contained coolant supply for a transpiration
3 cooled heat sink having a coolant pump disposed so as to communicate said coolant inlet
4 with said storage outlet.

1 23. A method according to claim 22, wherein said operating said self
2 contained coolant supply so as to produce said coolant includes operating said coolant
3 pump so as to cause said coolant to flow from said storage outlet to said coolant inlet.